

MULTISCALE COUPLING METHODS FOR MODELING AND SIMULATION OF MATERIALS

300 (MULTISCALE AND MULTIPHYSICS SYSTEMS)

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ABSTRACT

Problems with a wide range of coupled temporal and spatial scales are ubiquitous and essential in many phenomena and processes in the fields such as materials science. Those multiscale problems pose major challenges in modelling, mathematical analysis and computations. In particular, multiscale (connecting varying scales in the same problem) and multiphysics (simulation of physical processes of different kinds) simulations have moved to the forefront of research. In particular, multiscale coupling methods, such as atomistic/continuum coupling and QM/MM coupling, are a class of multiscale computational methods which combine the efficiency of coarse scale models and the accuracy of fine scale models. In the last decade, remarkable developments have been made in the analysis and implementation of multiscale coupling methods, while there are still many remaining open problems in the field. Advances in the development of multiscale coupling methods combined with continually increasing computational power have provided scientists with the unprecedented opportunity to study complex behavior and model systems with a wide range of scales.

In this minisymposium, we aim to provide a forum to present recent research results and exchange ideas between the mathematics and material science and engineering (MSE) communities on the advancements of multiscale coupling methods, particularly in the field of modeling and simulation of materials which can be seen in our list of prospective speakers.

Targeted themes include but not limited to:

- Multiscale modeling and simulation for microscopic material system.
- Coupling methods with different spatial and temporal scales
- Multiscale coupling methods for defects in materials
- Multiscale coupling methods with finite-temperature
- Adaptive methods for multiscale coupling models
- Fast algorithms for multiscale coupling methods
- Other advances in multiscale coupling methods

List of prospective speakers

Name	Affiliation
Christoph Ortner	University of Warwick
Shaofan Li	The University of California, Berkley
Dennis Kockmann	ETH Zürich
Qiang Du	Columbia University
Ellad B. Tadmor	University of Minnesota
Ping Lin	University of Dundee
Mitchel Luskin	University of Minnesota
Chuin-Shan David Chen	National Taiwan University
Woo Kyun Kim	University of Cincinnati
Jianfeng Lu	Purdue University
Alex Shapeev	Skoltech
Pingbing Ming	Chinese Academy of Sciences
Tom Hudson	University of Warwick
Xiantao Li	Penn State University
Helen Xingjie Li	University of North Carolina, Charlote
Julian Braun	University of Warwick